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November 22, 2010

MEMORANDUM FOR: W/OPS4 – Richard Vogt

FROM: W/OPS43 - J. Rex Reed

SUBJECT: Trip Report on Mexico Interchange November
9, 2010

Rich Ice and Rex Reed of the Radar Operations Center were invited to interact with Mexico radar experts in Brownsville, Texas on November 9, 2010. Brownsville was selected to eliminate the need for either nation to process foreign travel requests. (Mexican authorities can cross the border for day trips without a foreign travel authorization.) A detailed report on the interaction is at Attachment 1. The agenda and list of attendees for the meeting is at Attachment 2. Time available did not allow for all topics to be covered and the topics in red text at Attachment 2 were not discussed.

In summary, Mexico authorities are eager to learn about NWS radar experience. Their approach was to ask NWS personnel to make presentations on a wide variety of topics. When a topic led to a matter of interest to Mexico, SMN personnel entered into detailed discussions to expand on the topic. Most of the major discussions were on issues related to improving radar reliability. SMN noted that their current radar data availability is only about 50% and that their major radar data dissemination tool is the Internet. They want to significantly improve data availability and that is one of the major reasons for discuss radar issues with NWS.

The SMN made a major announcement on plans to install two radars to cover the Conchos and Salado River Basins no sooner than November of 2012. This is a topic of significant interest to the NWS. These rivers are major tributaries of the Rio Grande (known as the Rio Bravo in Mexico). The lack of good rainfall estimates from these river basins is a major factor on the inability of SMN or NWS to predict flooding on the Rio Grande/Bravo below the confluence of these rivers. **Since the availability of radar data will be of major benefit to NWS for flood prediction on the Rio Grande/Bravo, it is assumed that assisting SMN with their plans for installing new radars will be a NWS priority.** Specifically, SMN requested the ROC provide SMN with software that can be used to predict new radar coverage. ROC personnel agreed to investigate what will be required to provide SMN the appropriate software and terrain data for the purpose of locating new radars.

Along with radar coverage software, the ROC also agreed to provide SMN other technical information, as noted in the attached report.

At the end of the meeting, SMN participants expressed interest in future exchanges on weather radar topics. They also noted the need to have better translation capability in future meetings since some of the SMN attendees were not fluent in English.

Attachments:

1. Detailed Trip Report
2. Meeting Agenda and Attendee List

cc:
ROC Branch Chiefs

ATTACHMENT 1:
Trip Report on Mexico Interchange
November 9, 2010



*Prepared by
J. Rex Reed WSR-88D ROC Engineering
November 19, 2010*

DETAILED TRIP REPORT ON J. Rex Reed & Richard Ice Interchange with Mexico on NOVEMBER 9, 2010

EXECUTIVE SUMMARY:

Rich Ice and Rex Reed of the Radar Operations Center were invited to interact with Mexico radar experts in Brownsville, Texas on November 9, 2010. Brownsville was selected to eliminate the need for either nation to process foreign travel requests. (Mexican authorities can cross the border for day trips without a foreign travel authorization.) A detailed report on the interaction is at Attachment 1. The agenda for the meeting is at Attachment 2. Note that there were more participants from Mexico than are listed on the agenda. Time available did not allow for all topics to be covered and the topics in red text at Attachment 2 were not discussed.

In summary, Mexico authorities are eager to learn about NWS radar experience. Their approach is to ask NWS personnel to make presentations on a wide variety of topics. When a topic led to a matter of interest to Mexico, SMN personnel entered into detailed discussions to expand on the topic. Most of the major discussions were on issues related to improving radar reliability. SMN noted that their current radar data availability is only about 50% and that their major radar data dissemination tool is the Internet. They want to significantly improve data availability and that is one of the major reasons for discuss radar issues with NWS. Major reasons for low SMN radar data availability are a combination of low radar availability and poor data communications. The major issue with radar reliability is that SMN is not allowed to purchase and store spare parts. Mexican law requires that government purchases be put to immediate use, so when a radar part fails, the radar is down until a replacement part can be purchased, delivered and installed. SMN is thinking of overcoming this problem by contracting out the maintenance and operation of their radars, thus requiring a contractor to keep spare parts on hand for immediate radar repair.

The SMN made a major announcement on plans to install two radars to cover the Conchos and Salado River Basins no sooner than November of 2012. This is a topic of significant interest to the NWS. These rivers are major tributaries of the Rio Grande (known as the Rio Bravo in Mexico). The Rio Salado feeds into the Rio Grande/Bravo at Falcon Reservoir on the lower Rio Grande/Bravo; the Rio Conchos is the largest Rio Grande/Bravo tributary and it feeds into the Rio Grande/Bravo above Big Bend National Park. Neither river basin currently has significant radar coverage nor widespread rainfall measurement capability. The lack of good rainfall estimates from these river basins is a major factor on the inability of SMN or NWS to predict flooding on the Rio Grande/Bravo below the confluence of these rivers. **Since the availability of radar data will be of major benefit to NWS for flood prediction on the Rio Grande/Bravo, it is assumed that assisting SMN with their plans for installing new radars will be a NWS priority.** Specifically, SMN requested the ROC provide SMN with software that can be used to predict new radar coverage. ROC personnel agreed to investigate what will be required to provide SMN the appropriate software and terrain data for the purpose of locating new radars.

Along with radar coverage software, the ROC also agreed to provide SMN air conditioning specifications, information on air conditioning monitoring and specifications for un-interruptible power supplies specifications.

At the end of the meeting, SMN participants expressed interest in future exchanges on weather radar topics. Although Victor Murphy provided useful translation services, the SMN personnel noted the need for better translation capability in future meetings. About half of the SMN participants were not fluent in English and had trouble following most of the presentations/discussions. It is assumed they meant having translators to translate all conversations, rather than just translating key points, as was done in this meeting. If translators

are provided for future meetings, the problem will be to find translators who are familiar with the technical language used in discussions on weather radars. ROC personnel did try to bring Dr. Sebastian Torres of the National Severe Storms Laboratory. He is a native Spanish speaker and a research scientist intimately familiar with weather radar. However, he was not available for this meeting.

DISCUSSION:

The meeting followed the agenda provided at Attachment 2. The above summary provides information on the significant points discussed. Additional information on the discussions during the meeting, and actions assigned, are as follows.

SMN personnel advised that they have 13 weather radars in Mexico and there is another weather radar near Mexico City that is owned by a state government. They have a new radar near the Guatemalan border. This radar is about a year old, operates in the "C" frequency band and is dual polarization with new backup power, new civil works infrastructure and communications. The manufacturer is Selex/Gematronics in Germany. The unit has been operational since 2009 and has suffered some UPS and communication hardware damage, but thus far, SMN has been pleased with the overall performance.

SMN soon expects to award a contract for the installation of a new weather radar near Guadalajara. Bid evaluations are complete and they expect to announce the award soon. It should be noted that because of Mexican law, and the fact that each new radar is funded on a year by year basis, each new radar must be purchased on a separate contract, instead of using a single contract for multiple radar purchases. This results in Mexico having radars from different manufacturers, rather than all being from a single manufacturer.

In addition to new radars, SMN expects to award a contract soon to replace an existing radar in the Yucatan. This radar will be dual polarization, will operate in the "C" band and the contract will include power and civil works improvements.

Current plans are to contract for the replacement of another existing radar in 2011, with three companies competing for the contract.

The SMN radar budget was increased this year, and increases are expected to continue through 2012. This means SMN expects to be able to fund new radars in the Conchos and Salado River Basins no sooner than November 2012. SMN advised that they think the probability of getting funds for the new radars for the Conchos and Salado River basins is about 70%, that being a reasonably high probability from the SMN viewpoint. To assist SMN in determining the best sites for the new radars, SMN requests the ROC provide them with software to perform radar coverage studies. Internal to SMN, there is one other location competing for new radar funds. SMN personnel did not mention the location of this competing radar site.

Currently, SMN only provides radar data about 50% of the time. Because of the low data availability, potential users are reluctant to become dependent on the use of SMN radar data. A major SMN goal is to increase data availability. Among the problems in data delivery are radar availability and communication problems. Mexican law requires that items or services procured with federal funds must be used immediately. This means that SMN is not allowed to purchase and retain spare parts because the parts are not used immediately. When a radar part fails, the SMN must wait for the part to be repaired and returned, or must wait for a repairable part to be fixed and returned in order to bring a radar back into operation. The inability to have spare parts available is the major cause of low radar data availability. As a "work around" SMN is considering contracting out the operation and maintenance of their radars, thus requiring a contractor to stock repair parts to speed up repairs and improve radar availability. SMN was interested in ROC experience with various fiber optic technologies for communication and radar control signals as a means of improving overall radar and communication reliability.

With the exception of the new radar, the other SMN radars were manufactured in the 1970s through the 1990s. Seven of the older radars were manufactured by Erickson, while the other five were from EEC. The Erickson radars were upgraded with new, Sigmet signal processors in 2007. Some of the EEC radars have been “modernized”. Some radars are at remote, unstaffed locations, while others are co-located with SMN forecast facilities. Data from/to most radars is connected by satellite links for forecast facilities. The Erickson radars are controlled from a central control facility, while the EEC radars are each controlled by a local office. The plan is for all new radars to be controlled from regional or local offices, and not from a single, nation-wide control facility.

Recently, WMO performed a survey of SMN radars. They recommended that the EEC radars be totally replaced, while the Erickson radars, because they have relatively new signal processors, be retained. (SMN mentioned that the radar replacement planned for contracting in 2011 will be to replace an Erickson radar. They did not mention if the WMO report will cause them to change that plan to replace another EEC radar.) WMO further concluded that the location of existing radars is good, but not necessary optimal for land based hydrologic forecasting.

SMN is hoping to be able to put in place a 10 year contract for the maintenance and operation of their weather radars.

Most radar data dissemination, other than the links directly to forecast offices, is performed via Internet web pages. SMN personnel noted that they do not offer data “loops” since looping uses up a lot of bandwidth and impacts the performance of their web pages. They noted that when a hurricane or typhoon approaches Mexico, a person at Colorado State University downloads their radar images and creates radar data image loops on a CSU web page.

In discussions on the difference between “C” and “S” band radars, SMN posed the following: “If funds are limited and only \$2.5M is available for each new radar, is it better to have a “C” band radar with a reasonable sized antenna with a sharp radar beam, or is it better to have a “S” band radar with a similar antenna that will not provide as sharp a radar beam?” ROC personnel stated there are a lot of issues to consider, but in general, the “C” band solution would be better. This is because a wider beam would negate the longer range advantage of the S band system. Also, recent signal processing techniques have improved the data quality of both “S” and “C” band radars. Since Mexico already owns “C” band radars, it seems better for SMN to have all of their radars in that frequency band.

During discussions on air conditioning, SMN requested that the ROC provide them specifications for our weather radar air conditioners. SMN asked about specifying an air conditioner that controlled humidity. We replied that although we do have a radar equipment humidity specification, we do not levy such a requirement specifically on the air conditioner. SMN further requested that ROC provide them information on air conditioner alarms and remote monitoring requirements/capabilities. This question came after a remark that the ROC includes air conditioning monitoring as a part of the radar system since air conditioning status is reported via the radar control system.

In discussions on UPSs, SMN remarked that they use a rotary UPS device. The ROC responded that when we contracted for UPSs, we originally were delivered a rotary device. It proved unreliable for several reasons and we ended up changing to a static, battery based device that has proven to be very reliable and provides very “clean” power to the radar. SMN requested we provide information on and specifications for the NEXRAD UPSs.

At the end of the meeting, SMN personnel expressed interest in conducting future interactions on weather radar.

SUMMARY OF ACTIONS:

ROC agreed to investigate the possibility of providing SMN software with which to perform radar coverage studies for planning new radar locations, especially on the Conchos and Salado River basins. ROC further agreed to provide SMN specifications for air conditioners, information on air conditioning controls, information on UPSs and UPS specifications.

NWS/SMN/CONAGUA/IBWC RADAR WORKSHOP

Brownsville, TX
November 9, 2010

Brownsville City Plaza Meeting Room
1034 East Levee Street
Brownsville, TX78520

AGENDA:

Note: Items in red text were not covered during the meeting

DAY 1 – 9 November - Radar Topics

10:00AM

Introductions and Overview of Meeting Goals and Expectations
Victor Murphy, NWS Southern Region and Rex Reed, ROC

- Introduction of participants
- Quick Review of Agenda

10:30AM – 5:30 PM (Lunch 12:00 – 1:30)

Radar Specifications and Standards

- Description of US Weather Radar Network and Radar Operations Center (ROC).
- Description of Mexico weather radars (SMN).
- Available specifications and minimum standards of radar operations, maintenance, and acquisition.
- Discussion on how the specifications for an “S” band radar can be adjusted for procuring a “C” band radar.
- Radar software and data topics
 - Product Generation and Radar Control Software Implementation
 - Products generated
 - Scan strategies to the area of interest
 - Data formats of the radars in the USA (official WMO requirements)
 - Radars Data Base (Access, managing, and users software)
 - Hydrological calibrations currently going on in the USA
 - Band and ranges of the radars
 - Scheme of the information flux of the radar data

Radar Maintenance Experience

- Qualifications and training of WSR-88D maintenance personnel.
- Calibration.
- Information that should be in Operations and Maintenance documentation.
- Life cycle/refresh cycle for various types of hardware.
- Spare parts and support equipment.
- Antenna, moving motors, and antenna control.
- Safety measures.
- Building and civil works deterioration after long term radar operation.

- Security backups.

Adaptations to Improve Efficiency and Availability

- Implemented data quality enhancements.
- **Planned data quality enhancements.**
- Reliability improvements.
 - Adaptations to improve reliability and life cycles of hardware
 - **Interfaces to commercial power/protection/UPS**
 - **Lightning rod configurations**
 - **Air conditioning**

5:30PM

Wrap up

SMN Radar Attendees:

Michel Rosengaus, SMN Director of Radars and Networks
 Antonio Juarez, Organismo de Cuenca Golfo Norte
 Jorge Chavira, Organismo de Cuenca Golfo Norte
 Jorge Tokunaga, CGSMN Red de Radares
 Armando Rodriguez, CGSMN Red de Radares
 Modesto Mendoza, CGSMN Red de Radares
 Guillermo Perez Luna, (GASIR)
 Espiridion Gonzalez Navarette
 Doreoteo Trevino Puente
 Sergio Marvin Mancilla

NOAA Radar Attendees:

Rex Reed, ROC
 Rice Ice, ROC
 Caroline Corvington, NWS IA, 301-442-5142
 Victor Murphy, NWS SRH, 817-966-4216
 Ben Weiger, NWS SRH, 817-978-2652
 Barry Goldsmith, WCM, WFO Brownsville, 956-504-1432
 Steve Drillette MIC, WFO Brownsville, TX 956-504-1432 x 222
 Joel Veeneman WFO Corpus Christie, TX 361-299-1357 x 240
 Tim Tinsley WFO Corpus Christie, TX 361-289-0959